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Ballestrazzi et al.

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(54) **PROCEDURE FOR FEEDING PRODUCTS IN SHEET FORM TO A CONVEYOR AND PICK UP UNIT**

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(51) **Int. Cl.**[7] **B65H 3/08**; B65H 5/02
(52) **U.S. Cl.** **271/100**; 271/102
(58) **Field of Search** 271/11, 100, 102, 271/107, 277, 82

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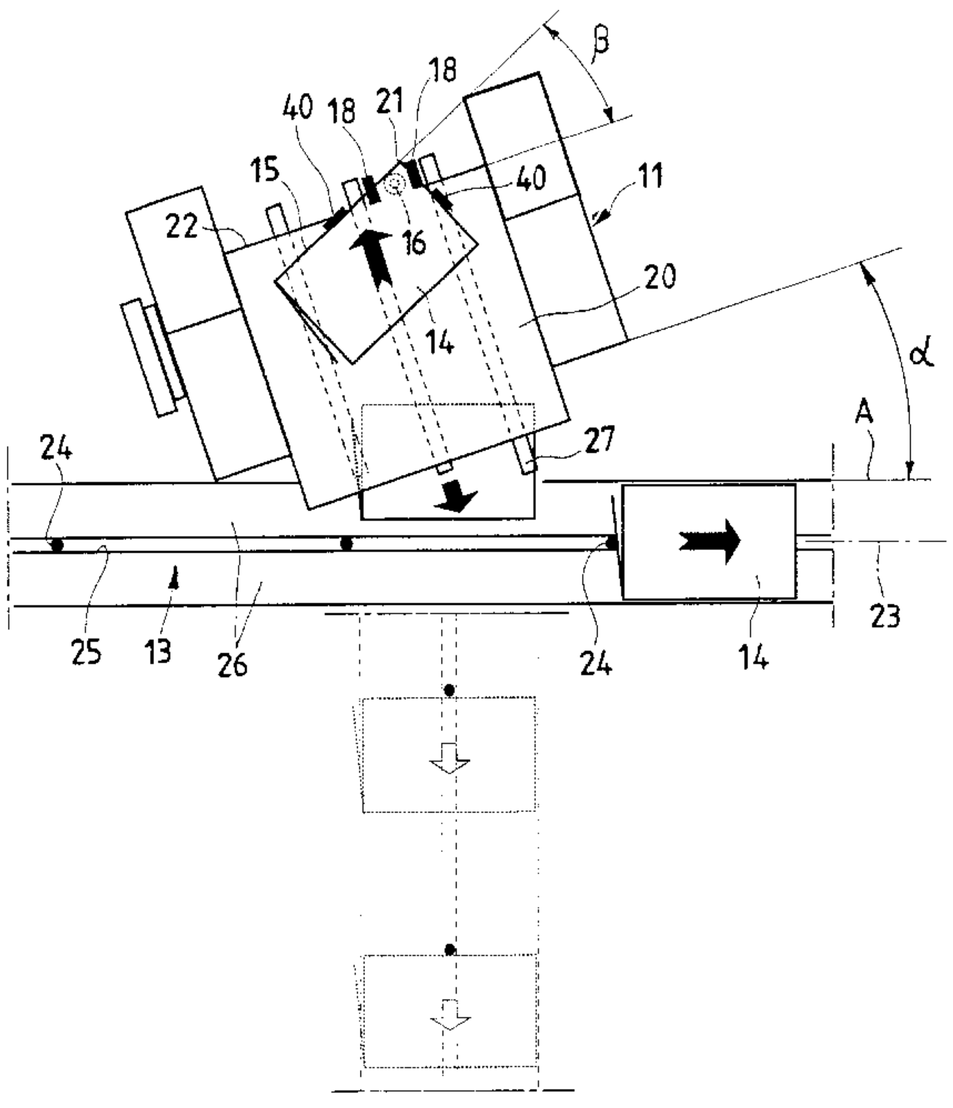
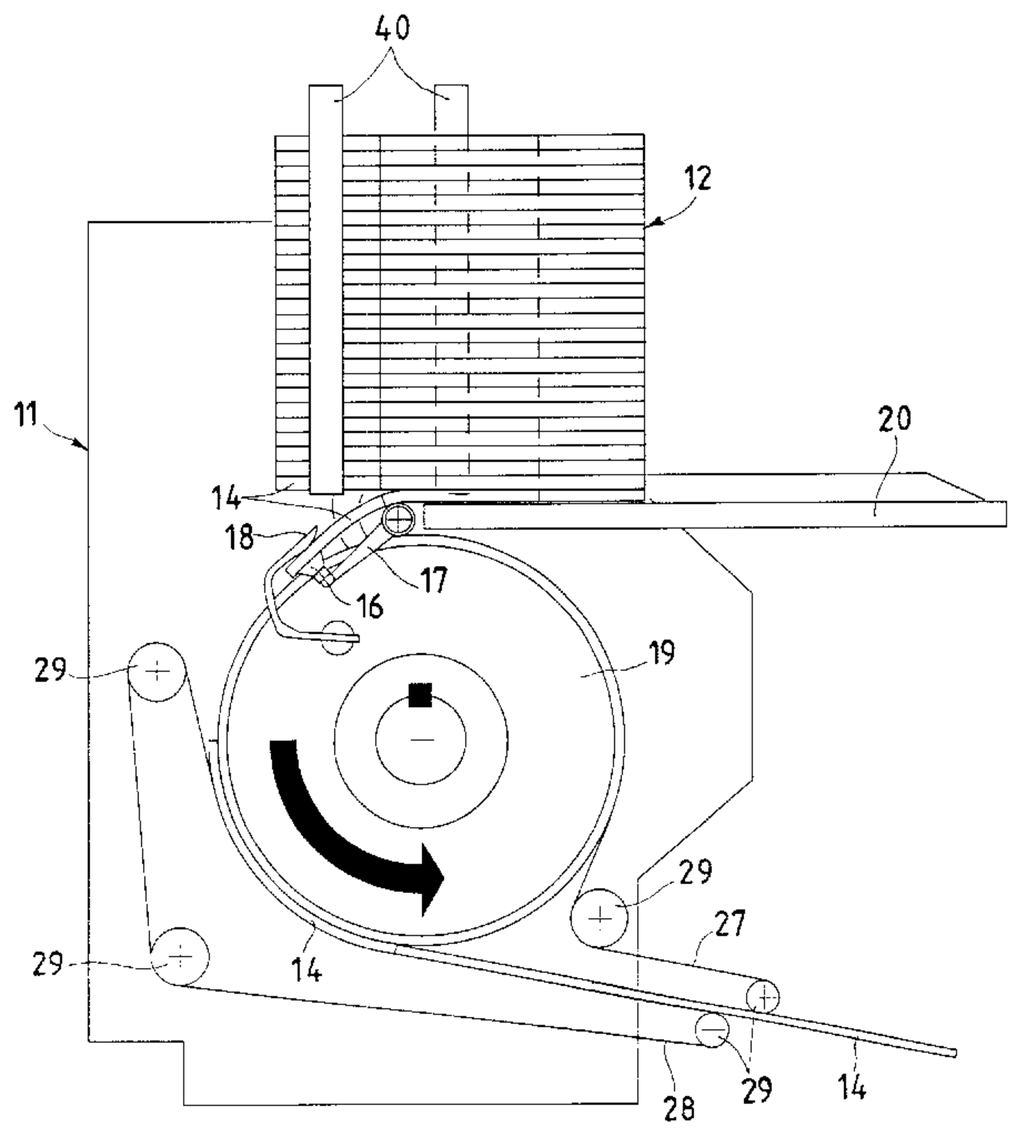
(57) **ABSTRACT**

A procedure for feeding products in sheet form to a conveyor by at least one sheet feeder with a pile of products in sheet form on a loading table includes the following phases. At least one sheet feeder is placed with a free edge of its loading table for the pile of products in sheet form inclined at an angle in relation to a direction parallel to a principal feed axis coinciding with the axis of the conveyor. A pile of products in sheet form is prepared to be placed on the loading table. The pile of products in sheet form is placed with a flat surface of these, provided with ribbing, inclined at an angle in relation to a pick-up assembly of at least one sheet feeder so that one corner or vertex of the products is placed projecting beyond the end edge of the loading table. A pick-up assembly in a sheet feeder uses this procedure.

11 Claims, 5 Drawing Sheets





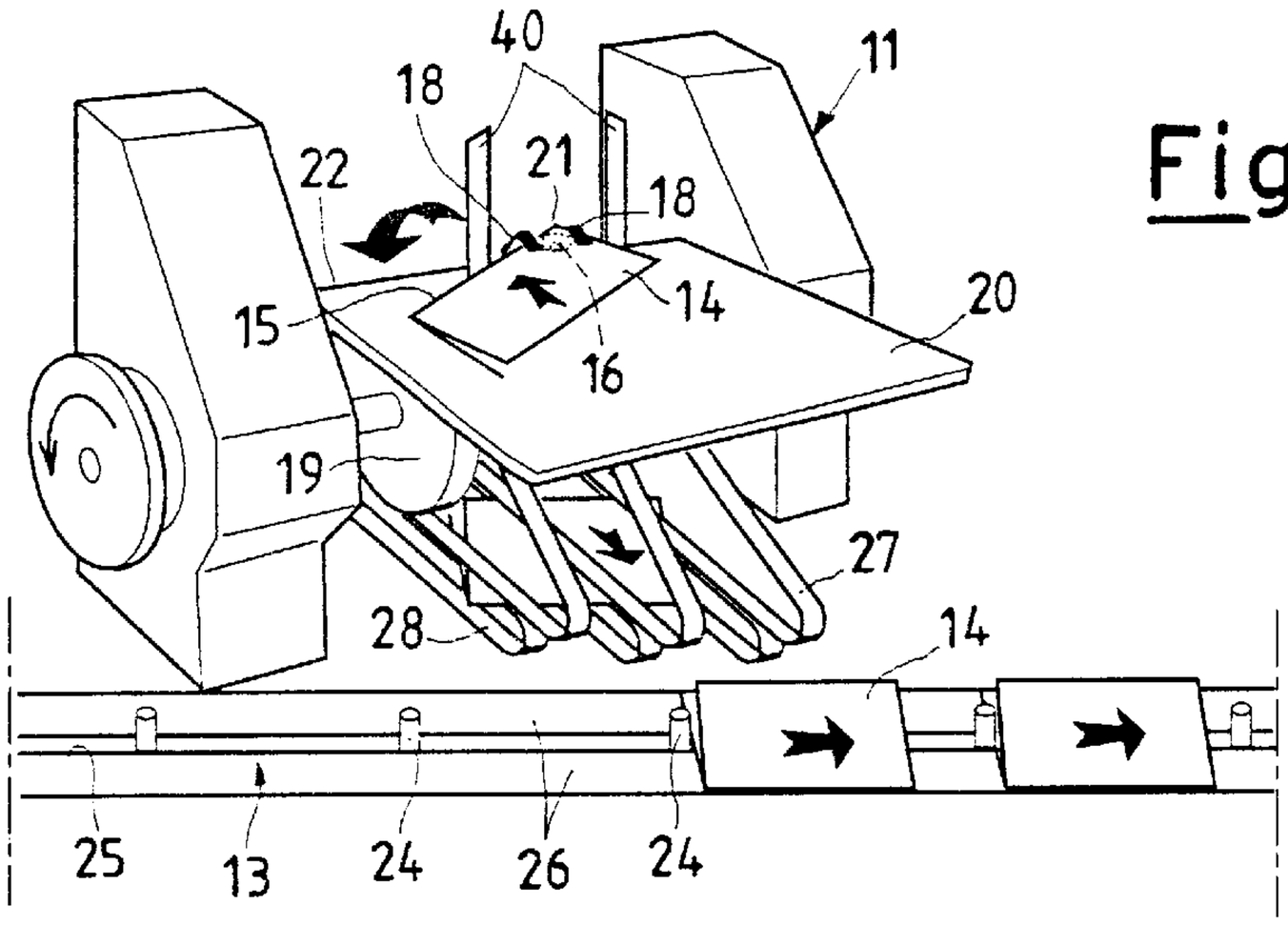

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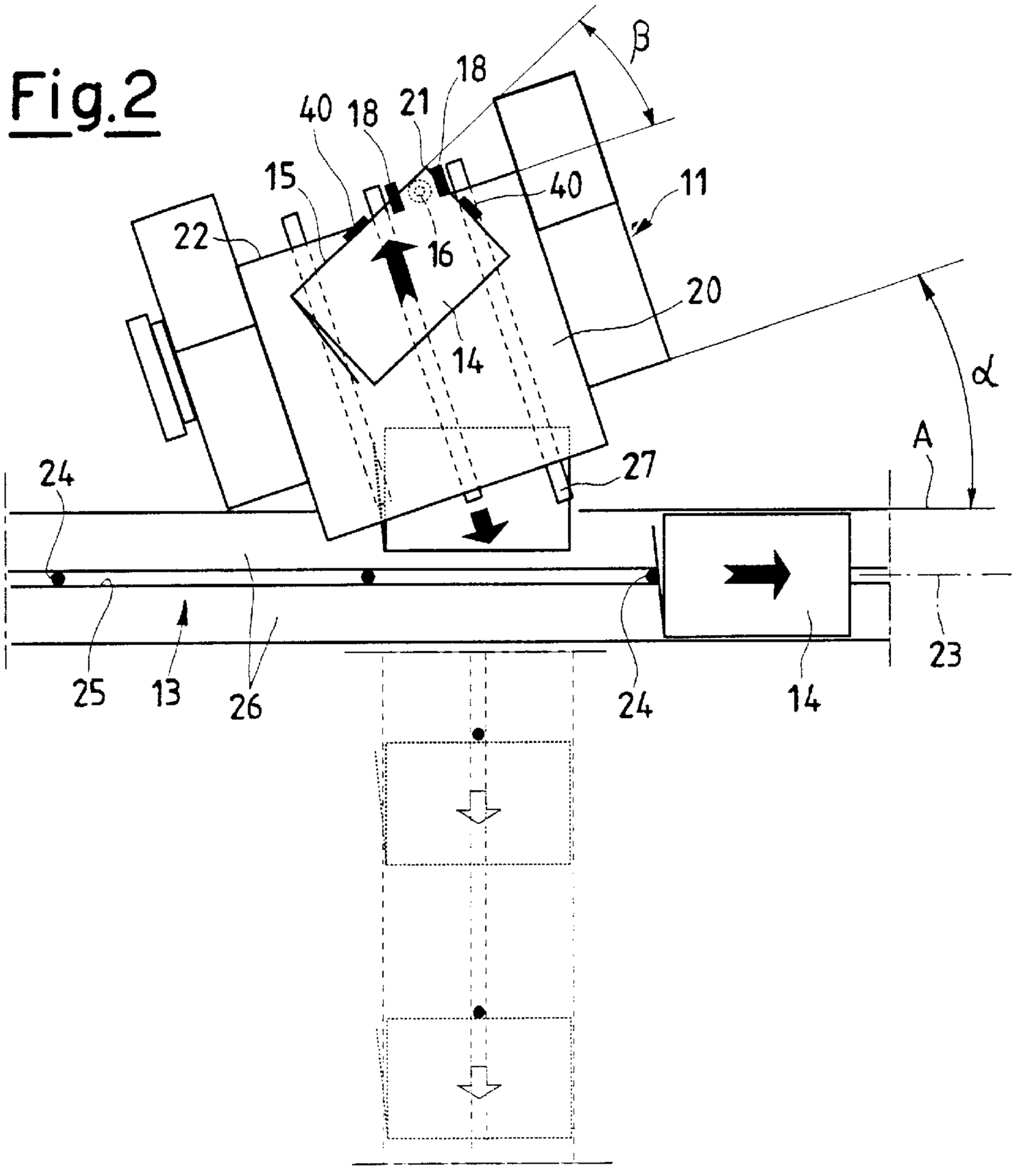
Fig.1

Fig.2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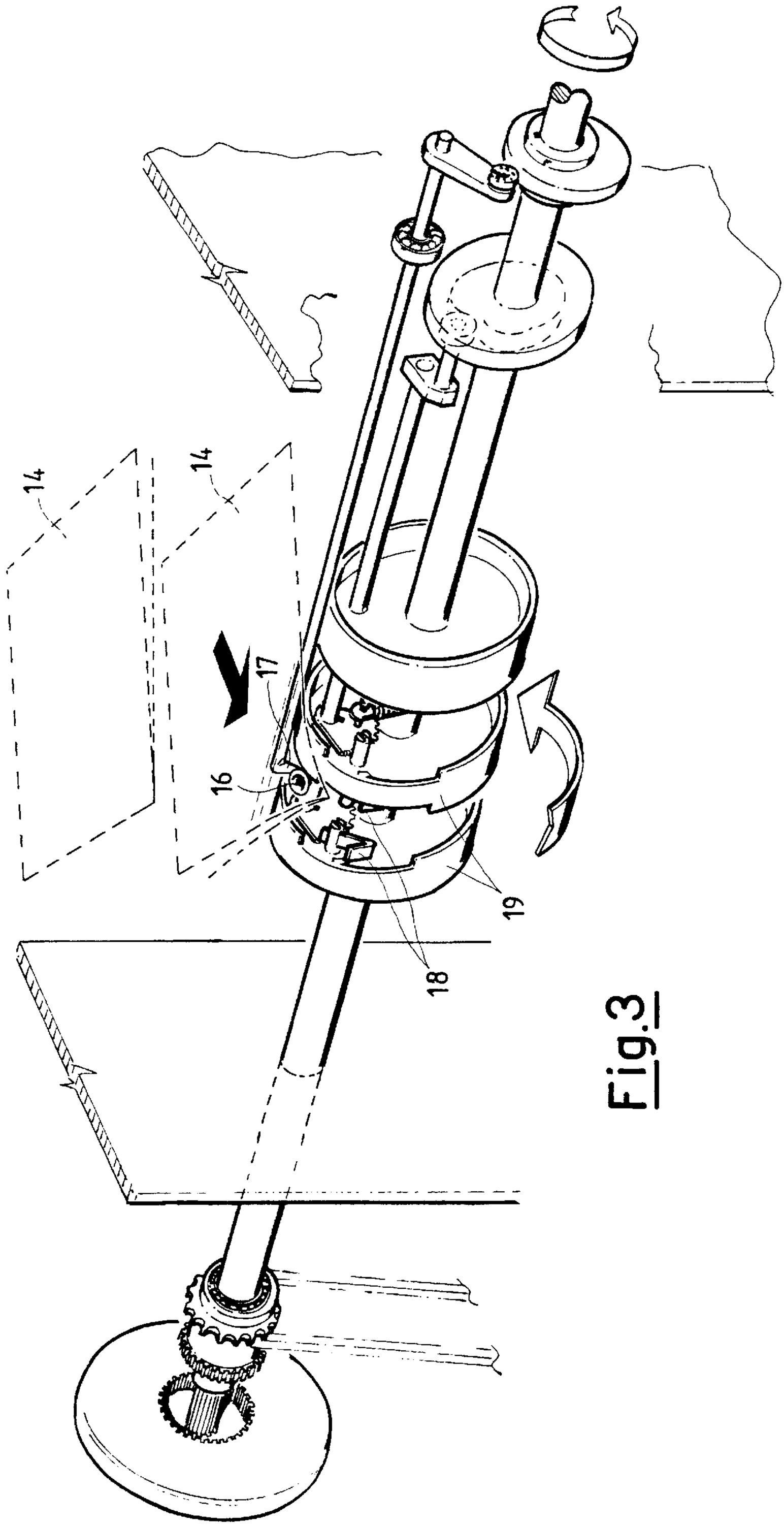


Fig.3

Fig.4

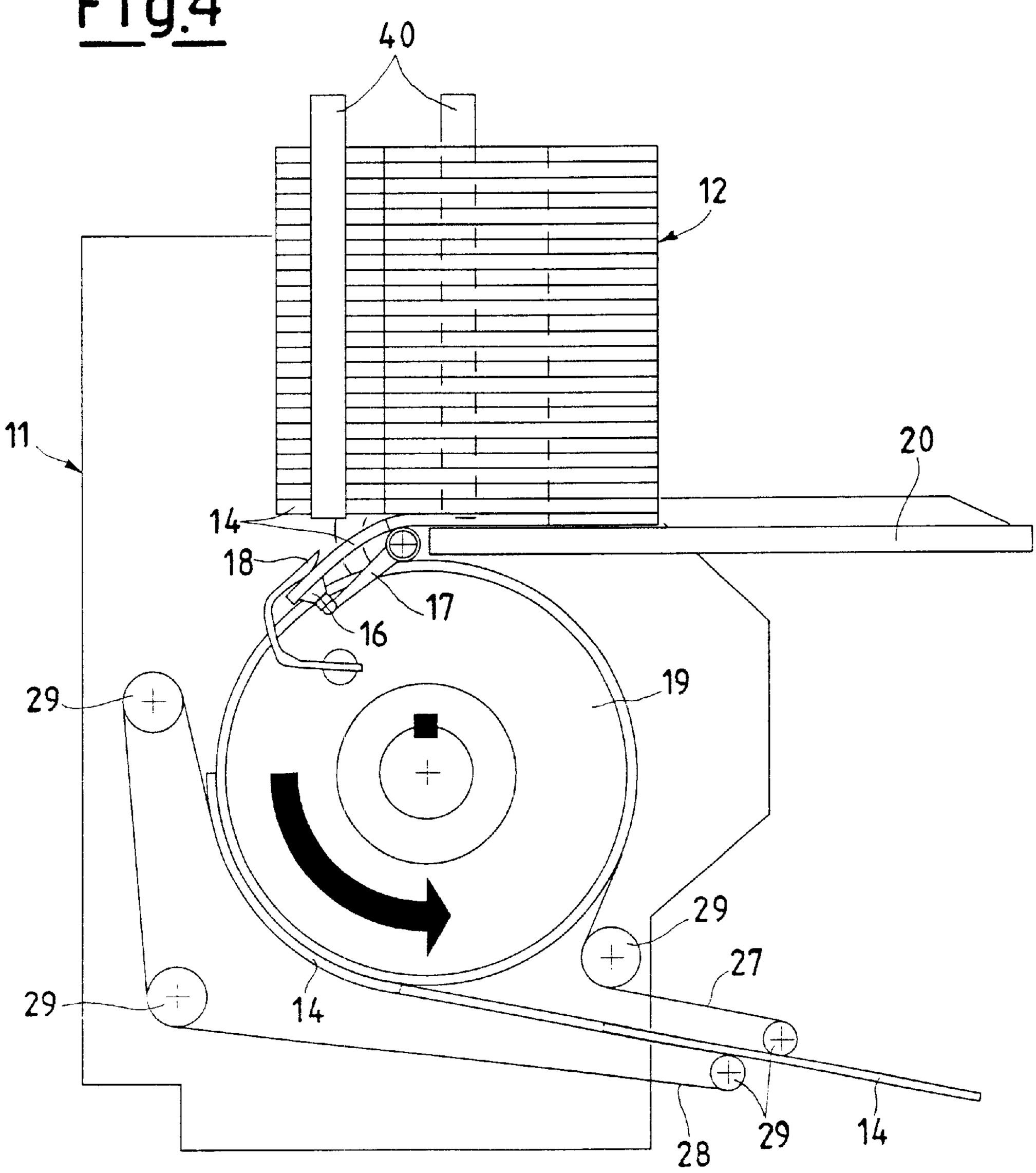
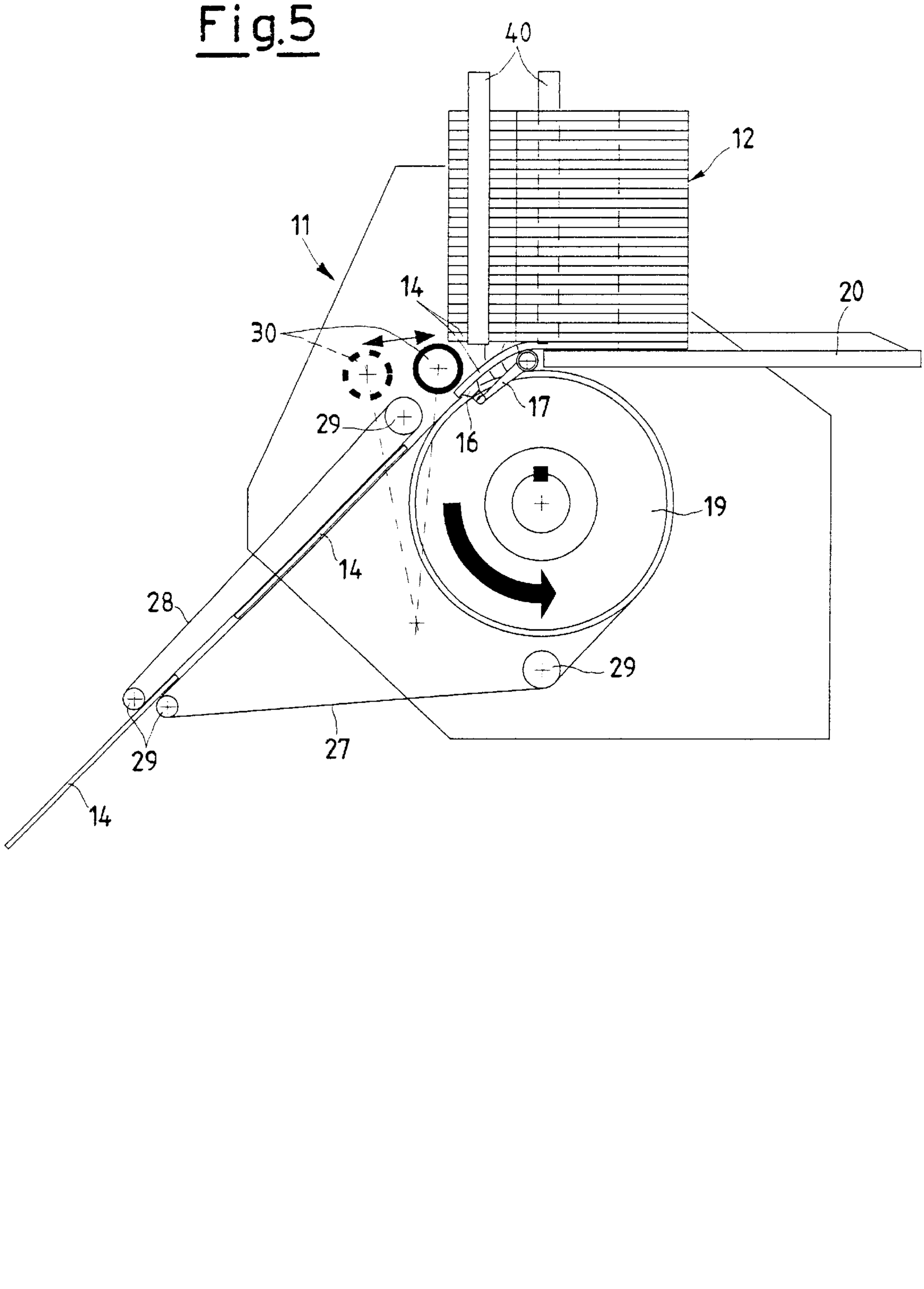


Fig.5



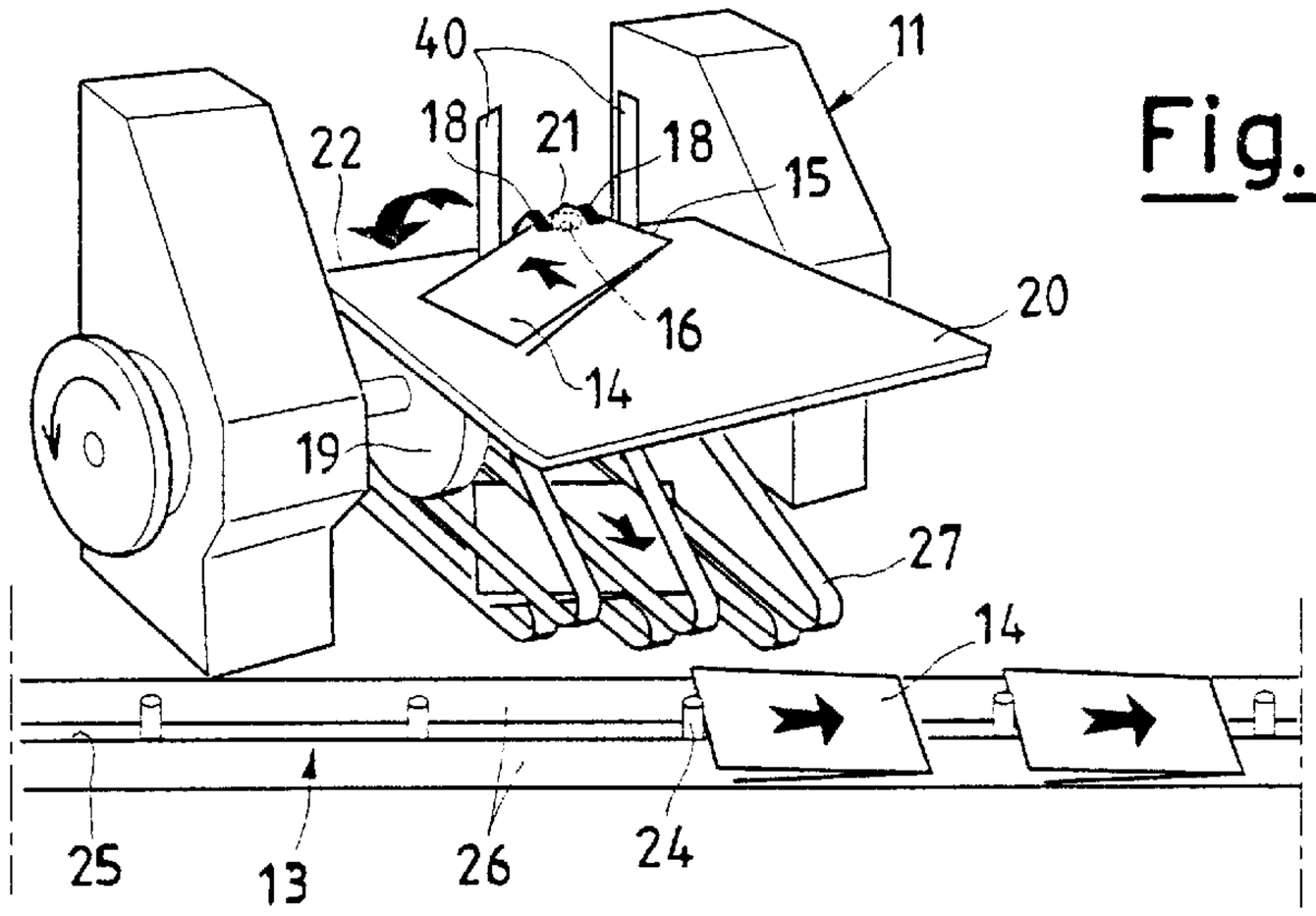

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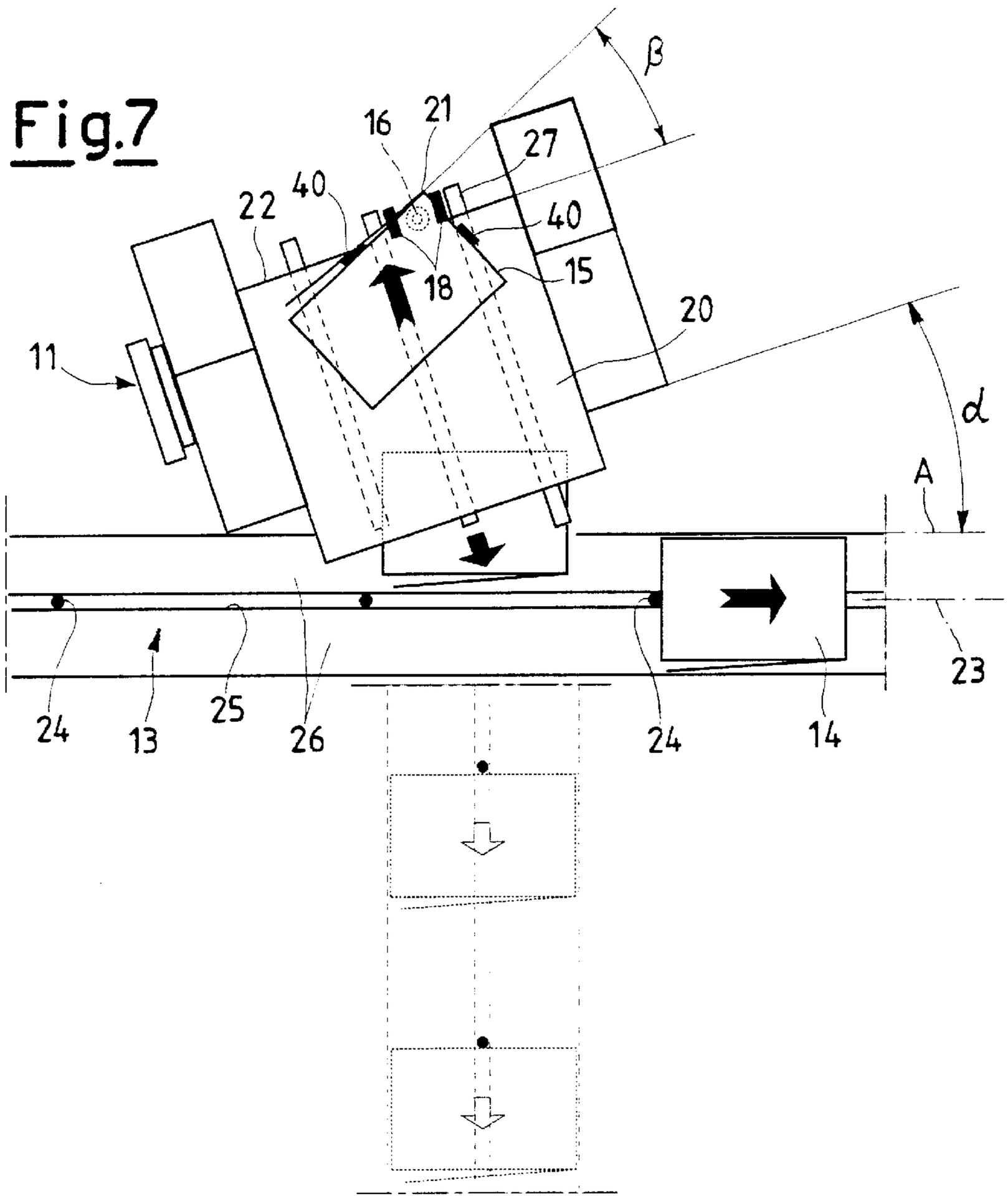
Fig.6

Fig.7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PROCEDURE FOR FEEDING PRODUCTS IN SHEET FORM TO A CONVEYOR AND PICK UP UNIT

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a procedure for feeding products in sheet form to a conveyor, in particular associated with an apparatus for packaging, and with a pick-up assembly in a sheet feeder that uses this procedure.

2. Discussion of the Background

In the field of the selection and transport products in sheet form, in particular in machines associated with packaging apparatus, there may be problems in correct and aligned feed of the products in sheet form, such as inserts, additional sheets, publishing products in general. In fact, these products usually require to be fed to a conveyor for collection and feed towards stations or machines for subsequent packaging and must be perfectly aligned over the underlying product.

In order not to create packaging problems and give the finished package, comprising the additional elements, a pleasing appearance, feed of single products in sheet form must be performed according to a direction well aligned and parallel to the one of the final position that must be obtained.

Moreover, it must be taken into account that to obtain a good grasp on the additional product it must e possible to grasp the product itself in an area with a certain amount of rigidity. This is also important in order for the product to be extracted without being broken and to avoid "tearing" of part of the product, which means it cannot be picked up by the suction cups.

Moreover, the current system for picking up and feeding the material in sheet form requires the transverse or longitudinal crease of the material in sheet form to be correctly aligned with the other publishing material to which it is to be added. Moreover, the insert or additional sheet must be correctly aligned with the pick-up area to enable it to be grasped correctly by the feeder or sheet feeder. For this purpose the feeder or sheet feeder is positioned laterally or astride the conveyor so that the insert can be grasped along the crease or the rigid area of this to be grasped correctly, as mentioned above.

The machine operator must then proceed, once the series of products and/or inserts to add on top of one another for subsequent packaging is known, to arrange the various sheet feeders according to the positions required depending on the crease of the particular insert and depending on the final position to be obtained in the package. This operation causes a loss of time to move the sheet feeder to the correct position.

SUMMARY OF THE INVENTION

The object of the present invention is to find a solution to these problems, by feeding products in sheet form towards a conveyor, in particular for example associated with a packaging apparatus, which generally consents feed of a generic insert, whatever the position (longitudinal or transverse) of its rigid or creased part.

This object according to the present invention is achieved by performing a procedure to feed products in sheet form to a conveyor, in particular associated with a packaging apparatus, and a pick-up assembly in a sheet feeder that uses this procedure, according to what is set down in the independent claims.

Other characteristics emerge from the subsequent appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The characteristics and advantages of a procedure for feeding products in sheet form to a conveyor, in particular associated with a packaging apparatus, and a pick-up assembly in a sheet feeder that uses this procedure according to the present invention shall become clearer from the description below, given as a purely exemplary and non-limiting example, referring to the appended schematic drawings, in which:

FIG. **1** is a perspective view of a sheet feeder positioned according to the present invention which grasps a product with longitudinal rib,

FIG. **2** is a top plan view of the sheet feeder in FIG. **1**,

FIG. **3** is a schematic view of an internal part of a grasping device with publishing product or insert being grasped, of the type shown in FIG. **1**, indicated with broken lines,

FIG. **4** shows a side elevation view of a device according to FIG. **1** with overturning of the picked up product,

FIG. **5** shows a side elevation view of a device fed according to the present invention without overturning of the product fed to the conveyor,

FIG. **6** is a perspective view of a sheet feeder positioned according to the present invention that grasps a product with transverse rib,

FIG. **7** is a top plan view of the sheet feeder in FIG. **6**.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The figures in general schematically show a sheet feeder, namely a feeding device for single products in sheet form **11** by means of which the single products **14** are extracted from the bottom of a pile **12** and fed towards a conveyor **13**, in particular associated with a packaging apparatus, not shown.

It must firstly be stated that each product in sheet form **14** included in the pile **12** in general has a rib or ribbing **15** produced by folding its two panels. The products **14** are stacked and held in place by vertical guides **40**, which allow pick-up by the suction cup and extraction of the last product at the bottom of the pile **12**. This rib or ribbing **15** can be provided in a larger direction (longitudinal) or smaller direction (transverse) of the final product **14**. In this way the product **14** has a portion provided with greater rigidity where it is normally grasped by an element designed for this operation, such as a suction cup **16** positioned on a up-and-over arm **17** and/or a clamp **18** associated with a specific clamp-bearing wheel **19** or an oscillating roller **30**.

According to the present invention, the sheet feeder **11** is first positioned with a free edge **22** of its loading table **20** inclined according to an angle a in relation to a direction A parallel to a principal feed axis **23** which is an axis coinciding with the axis of the conveyor **13**.

After this first phase to position the sheet feeder **11**, a second phase prepares a pile **12** of products in sheet form **14** to place on a loading table **20** of a sheet feeder or similar device. The subsequent phase is a phase to place this pile **12** of products in sheet form **14** with a straight surface of these, provided with ribbing **15**, according to a direction inclined to an angle β in relation to a pick-up assembly, for example the suction cup **16** and the clamp **18**. More precisely, the pile **12** of products must be positioned so that one corner or vertex **21** of these products **14** is taken towards the end edge

22 of the loading table **20** of the **15** sheet feeder **11** or similar device. The ribbing **15** is also inclined to an angle β in relation to the end edge **22** of the loading table **20**.

It is therefore essential to have previously inclined the sheet feeder **11** to the angle a in relation to the principal feed direction **23**, coinciding with the direction of the conveyor **13**. This conveyor **13** is usually a conveyor with pushers **24** which slide step by step inside a longitudinal slot **25** in a sliding table **26**.

In this way, the sheet feeder **11** can be installed to the side of the conveyor line **13** of the products **14** fed step by step. By means of an element to vary the position of the product in motion, the sheet feeder **11**, varies the position of the product in sheet form **14** conveyed, bringing it parallel to the direction of feed of the conveyor **13** with a minimum angle of variation.

The FIGS. **1–3** and **6–7** show how it is uninfluential on the procedure of the present invention whether the product to be fed has a rib or ribbing **15** provided according to a larger longitudinal direction or a smaller transverse direction. In fact, in both cases a safe grasp is obtained on the corner or vertex **21** of these products **14**, thanks to this arrangement.

Moreover, the pick-up elements are reduced as only one suction cup is required to separate and convey, on the wheels bearing the clamp or the roller, the vertex of the product to be extracted from those stacked on the loading table or magazine.

Advantageously, there are no cantilever products during the phases to extract the bottom product from the pile; this is obtained thanks to the inclination of the cantilever product in relation to the end edge **22** of the loading table **20**. This eliminates specific devices to support the cantilever surfaces of the product, such as points, pins or moving serrations, that were required and damaged the product to some extent during extraction from the bottom of the pile. Moreover, it must be mentioned that these devices were not capable of guaranteeing secure support to the product.

Grasping of the corner or vertex **21** of the product is possible as this corner, no matter what type of ribbing the product has, gives the grasped product a certain amount of rigidity.

According to the present invention a product in sheet form can consequently be fed towards the step by step conveyor, whether this product has longitudinal ribbing or transverse ribbing in relation to the direction of movement.

In this way, with the sheet feeder positioned in the same way it is even possible to feed in succession a product with longitudinal ribbing such as a magazine and a product with transverse ribbing such as a wall calendar.

In fact, in both cases the longitudinal or transverse ribbing, by providing a rigid area in the part of the product being grasped (corner or vertex), contributes towards self-support of the product, also preventing more than one product from being grasped from the bottom of the pile.

FIG. **3** shows how in a device that uses this method only one suction cup **16** is fitted between a single pair of clamps **18** positioned on relevant wheels **19**.

FIG. **4** shows the route of single products **14** along the wheels **19** with the aid of guide belts **27** and **28**, ring-wound on transmission wheels **29** and which lock the product between them to feed it overturned to the conveyor **13** positioned at the side.

FIG. **5** shows the route of a single product **14** extracted from the bottom of the pile **12** along a small portion of the wheels **19**, in this case the product **14** being fed directly after being extracted from the bottom of the pile towards the conveyor positioned at the side. In this case the single products **14** are fed to the conveyor **13** which is positioned at the side thanks to the cooperation of the guide belts **27** and **28**, associated with the wheels **19**, and the presence of an oscillating roller **30**.

Both FIG. **2** and FIG. **7** show how the conveyor **13** can be realized with travel essentially parallel to the travel of the sheet feeder or even perpendicular to this. In both cases, the free edge **22** of the loading table **20** is inclined according to an angle α and respectively (90°–α) in relation to said principal feed axis **23** which coincides with the axis of the conveyor **13**. In this way feed is also implemented in favour of the sense of feed of the conveyor, in addition to optimum and simple grasping of the single product in sheet form from the pile positioned on the sheet feeder.

What is claimed is:

1. A process for feeding products in sheet form to a conveyor by at least one sheet feeder bearing a pile of products in sheet form on a loading table, comprising:

placing the at least one sheet feeder with a free end edge of the loading table inclined at a non-zero first angle in relation to a direction parallel to a principal feed axis coinciding with an axis of the conveyor;

preparing the pile of products in sheet form on the loading table;

placing the pile of products in sheet form with a flat surface provided with ribbing, at a direction inclined at a non-zero second angle in relation to a pick-up assembly of the at least one sheet feeder so that one corner or vertex of the products is positioned projecting beyond the free end edge of the loading table, wherein the free end edge of the loading table is a back edge of the loading table furthest away from the conveyor.

2. Procedure as claimed in claim **1**, wherein the pick-up unit has only one suction cup and at least one clamp to grasp and extract the one comer or vertex of the products.

3. Procedure as claimed in claim **1**, wherein the pick-up unit has only one suction cup and at least one roller to grasp and extract the one comer or vertex of the products.

4. Procedure as claimed in claim **1**, wherein the pick-up unit feeds the conveyor overturning one of the products in sheet form taken from a bottom of the pile of products in sheet form on the loading table.

5. Procedure as claimed in claim **1**, wherein the pick-up unit feeds the conveyor directly with one of the products in sheet form taken from a bottom of the pile of products in sheet form on the loading table.

6. A system for feeding products in sheet form to a conveyor, comprising:

at least one sheet feeder bearing a pile of products in sheet form on a loading table, wherein the at least one sheet feeder includes a free end edge of its loading table for the pile of products in sheet form inclined a non-zero first angle in relation to a direction parallel to a principal feed axis coinciding with an axis of the conveyor;

wherein the pile of products in sheet form is configured to be placed on the loading table with a flat surface provided with ribbing, at a direction inclined at a non-zero second angle in relation to a pick-up assembly of the at least one sheet feeder so that one corner or vertex of the products is positioned projecting beyond the free end edge of the loading table, wherein the free end edge of the loading table is a back edge of the loading table farthest away from the conveyor.

7. A system of claim **6**, further comprising:

only a single suction cup positioned under the free end edge of the loading table and movable to engage with the corner or vertex of the products to grasp and feed one of the products in sheet form extracted from a bottom of the pile of products in sheet form towards the conveyor.

8. A system as claimed in claim **7**, further comprising, downstream from the single suction cup, at least one clamp fitted on a clamp-bearing wheel to receive the corner or vertex and to lock the corner or vertex on the clamp-bearing wheel before unloading the one of the products in sheet form onto the conveyor.

9. A system as claimed in claim **8**, further comprising, in cooperation with the single suction cup and the one clamp-bearing wheel bearing a clamp, at least one pair of guide belts ring-wound on transmission wheels and on a clamp-bearing wheel, which lock each extracted product between them to feed each extracted product overturned to the conveyor positioned at a side.

10. A system as claimed in claim **7**, further comprising, downstream of the single suction cup, at least one roller configure to grasp the corner or vertex and to extract the corner or vertex before unloading the corner or vertex, onto the conveyor.

11. A system as claimed in claim **7**, further comprising, in cooperation with the single suction cup and the roller, at least one pair of guide belts ring-wound on transmission wheels, which lock each product between them to feed each product overturned to the conveyor positioned at a side.

* * * * *